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PROGRESS OF MEDICINE

1850-1900

AN ORATION
DELIVERED BEFORE THE
NORFOLK DISTRICT MEDICAL SOCIETY
AT THE
CELEBRATION OF THE SEMI-CENTENNIAL OF ITS ORGANIZATION

MAY 8, 1900

BY

HAROLD C. ERNST, A.M., M.D.
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PROGRESS OF MEDICINE.

PROBABLY no period in the history of medicine has been so prolific of changes and, as we believe, of progress, as the last fifty years, and it is my pleasant duty — at the request of your committee of arrangements — to place before you, as clearly as may be, an outline picture of how this progress has been accomplished.

The great steps of medical advance, beginning with the application of ether to the relief of pain in surgical procedures in 1846 at the Massachusetts General Hospital, and almost co-existent with the life of this society, have accomplished so much, that a brief review of the changes is necessary to enable us to realize what has been done. These are changes too that are of the utmost practical value, and in medicine we are little liable to the reproach of the search after useless knowledge, for we should believe, and most of us do, that "the knowledge which a man can use is the only real knowledge, the only knowledge which has life and growth in it, and converts itself into practical power. The rest hangs like dust about the brain or dries like rain drops off the streets." (Osler, "After Twenty-five Years," p. 11, reprint from Montreal Medical Journal, November, 1899.)

Now progress in medicine occurs by the increase in means for study; the growth of hospitals and dispensaries for the care of the sick and the study of disease on the one hand, and by the enlargement of the means for presenting the material thus brought together to the students of medicine — as well graduates as undergraduates — on the other.

How this has been accomplished in our own vicinity I shall endeavor to show you, and then to give you a very brief

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review of what similar changes all over the world have done for our knowledge and management of disease processes in the human race.

It is exceedingly interesting to find that of the 110 (approximate) institutions in Massachusetts devoted to the care and treatment of the sick but 13 of them were in existence previous to 1850: [Massachusetts General Hospital, incorporated 1811, open to patients September 3, 1821; McLean Asylum for Insane (name changed by Trustees in 1892 to McLean Hospital, Department for Insane), authorized in charter of 1811, opened for patients Oct. 6, 1818; Boston Lying-in Hospital, organized in 1832; Massachusetts Eye and Ear Infirmary, started by John Jeffries and Edward Reynolds, who hired a room, November, 1824, in Scollay's buildings; Boston Lunatic Hospital, 1839; Small-pox Hospital, 1817; State Lunatic Hospitals (Worcester, authorized March 10, 1830, Taunton, authorized May, 1851); Massachusetts School for Feeble-minded, organized 1848; Barre Institute for Feeble-minded Youth, organized 1848; Essex County Receptacle for Insane; Lowell Hospital, organized 1840; Salem Dispensary, organized 1824; Boston Dispensary, organized 1796; Lowell Dispensary, organized 1836]; that some of these were merely talked of at that time and were not carrying on effective work, and that a very large part of them were intended for the treatment of mental degenerates of one kind or another. Also that one of the very first acts of the Norfolk District Medical Society was to pass a vote: "Voted, that a committee be appointed to prepare, in the name of the society, a memorial to be presented to the next Legislature of Massachusetts setting forth the want of further and better provision of means and authorities in Norfolk County, for the admission of lunatics into the State Lunatic Hospital from Norfolk County." It would be a difficult matter to interpret this fact correctly. To some it might seem to indicate — what has often been asserted — that the hard New England life of early days had a double effect, in providing for the survival of the physically strong, and in producing an undue amount of mental strain in those who survived the other hardships. Other students would place no such interpretation upon these facts.

Studying the times by decades when the various institutions for the sick have been established in this commonwealth, the enormous increase of late years is a very noteworthy fact. From 1850–1860 there were but five new institutions founded: The Boston City Hospital, which was incorporated in 1858, but not dedicated until May 24, 1864; The Channing Home, May, 1857, incorporated 1861; The House of the Good Samaritan, incorporated in 1860; Taunton Lunatic Hospital, organized in May, 1851; Northampton Lunatic Hospital, authorized May, 1855. From 1860–1870 there were twelve, of which the most important were the Carney Hospital, established 1864, incorporated 1865; The Children's Hospital, incorporated Feb. 26, 1869; The New England Hospital, incorporated 1863; Tewksbury Asylum for the Chronic Insane, 1866. From 1870–1880, twenty-four: Danvers Lunatic Hospital, authorized 1874, opened 1878; Worcester Insane Asylum, 1878; and in the last twenty years there have been no less than fifty-eight public and private institutions for the treatment of disease opened, with others projected or under way. In other words, there has been more provision made for the sick and infirm in these last twenty years than in all the preceding existence of the Commonwealth.

What appears to me to be the most notable fact about this increase is the many small local hospitals that have been started. I mean by this the small town and city hospitals that are springing up in such numbers all over the State. Sometimes their foundation is due to the liberality and public spirit of one member of the community — sometimes to the affection of an individual for the place of his birth, but whose life has been passed entirely away from it ; and very commonly again to the civic pride of the governing authorities, who thus wisely use some of the funds at their disposal for the care of the unfortunate and the protection of the well. There is no doubt in my mind that this establishment of local hospitals in small towns and centres of population is a movement to be fostered and encouraged in every possible way. For, although it is true that great institutions for the care of the sick can be managed more economically on the average, and that the collected wisdom of the staff of such an institution is greater than can be reached by one of less experience, it is equally true that all these advantages are often much more than counterbalanced by the fatigue, exposure, and delay to which patients transported from a distance are often subjected. So, also, provision must be made for the growth of population, and great and freely offered as are the facilities of our older and larger hospitals, they cannot ever begin to cover the entire need for the whole State.

Another most notable incident in the history of hospital building in the last ten years is the opening of the State Hospital for the cure of consumption at Rutland, which shows by its presence the recognition of the duty of the government of the State to provide for this scourge of civilized communities, and by its work the great benefit that may accrue to those affected with this disease by proper management and care. Its benefits, too, are not confined to those received under its roof, but through them when discharged some knowledge of the proper management of persons sick with pulmonary tuberculosis and of the infectious material coming from them is disseminated slowly but surely among the neighbors. The pity is that it is not possible to take care of *all* those needing it, instead of only a small portion.

Finally, as regards hospitals. In the last twenty years the phenomenal growth of the Massachusetts General and McLean Hospitals, of the Massachusetts Eye and Ear Infirmary, and of the Boston City Hospital are especially striking. The McLean Hospital, opened, as few of us realize, *before* the Massachusetts General, has made its move to the magnificent situation and plant where its usefulness is to increase and spread for years to come. The Massachusetts General Hospital has not made a change in site, but has been in a constant state of unrest in tearing down and building up again, and when its present plans are completed is likely to present an incomparable surgical hospital to the world. These two institutions, which are really one, present the spectacle of the superb results from private benevolence that follow years of accumulation of funds and continued wise management. The Massachusetts Eye and Ear Infirmary has within a few years entered upon a large career of usefulness in its buildings, beautifully arranged and constructed for its special needs, furnished for the hospital in large measure by private gifts, but also aided by the State. The contrast is striking between the present great charity and institution of instruction, with its staff of over thirty medical men, its yearly treatment of over twenty-two thousand new patients with eye and ear disease, and the rooms in Scollay's Buildings of its founders, — Drs. John Jeffries and Edward Reynolds, in 1824, — where "in sixteen months 824 persons applied for treatment."

Lastly, as an institution of which all citizens of Boston may be justly proud, the growth of the Boston City Hospital shines before us all — an institution still on the site first chosen for it, but so different that, except for the central dome, its originators would hardly know it. Supported wholly by the liberality of the city government, and commanding this liberality at need by the continued excellence of its management and beneficence, it is truly a model which we can all point to with pride as a demonstration of what a municipal institution of the kind should be. That this hospital will also in the future receive its share of private benefactions needs no further proof than the beautiful Ann White Vose Home for its nurses, which forms the last addition to its equipment. These are the most striking illustrations of the growth of great hospitals that we can see around us, but the money expended upon and superb results obtained in the Boston Lying-In and the Children's Hospitals must not be passed by without mention, for their work is of too great value in itself, and in the cause of medical progress, to be neglected. This is true also of the Boston Dispensary that for over a century has been doing the good it came to it to do among the sick poor, without ostentation and without display, but first in the field for the care of the sick; first in the field of instruction for the improvement of medical knowledge, and first to-day in the number of persons that are yearly benefited by its administration.

Another of the institutions for the advancement of medicine that has been born to usefulness since that first meeting of the Norfolk District Medical Society in Dedham on Nov. 19, 1850, is the Boston Medical Library. The importance of a medical library to the medical profession is no less than that of a general library to the general public, but on the contrary is greater; — and this need of the profession has been recognized and attempts made to satisfy it from an early date. In 1805 the names of Drs. John C. Warren and James Jackson are found connected with an effort to form a library, as in connection with so many other good works of their time, and while their efforts did not result in a permanent foundation, this failure must rather be ascribed to lack of pecuniary power and numbers than of appreciation of the need. That collection of books passed to the Boston Athenæum, which gave certain privileges in return, and the next collection formed was at the Massachusetts General Hospital, from the gift of Dr. J. C. Treadwell of Salem in 1857. The present Boston Medical Library Association furnishes a means of study and research that grows more and more valuable as the years go by, and, if the present hopes are gratified, and plans carried out, will before long be housed as becomes the literary headquarters of the profession in this State. (Now accomplished, May, 1901.)

As the instrument of instruction in which we are most interested, and from which most of us derived our early knowledge of medicine; as the means by which, if at all, all the institutions already spoken of may be made to fulfil their highest function, of teaching, we come to the Harvard Medical School. It is difficult for us to realize the condition of the school and the college fifty years ago when we see the condition of things at present. It would not take long to read to you the entire announcement of the Medical School of 1850; it is extremely interesting to those concerned in medical instruction, but a few extracts and comparisons will serve the purpose without making too great delay. The entire Faculty of the Medical School of the year 1849–1850 consisted of eight gentlemen including the president: Jared Sparks, President; Walter Channing, M.D., Jacob Bigelow, M.D., John W. Webster, M.D., John Ware, M.D., John B. S. Jackson, M.D., Oliver W. Holmes, M.D., Dean of the Faculty; Henry J. Bigelow M.D. (succeeding this year, Dr. George Hayward). This is somewhat different from the announcement in the catalogue of 1899–1900, where are the names of thirty-four members of the Faculty, and eighty-seven instructors and assistants engaged in teaching, but without seats in the Faculty. The summary (of the entire University) shows at that time:

Professional students and resident graduates.	
Theological students	17
Law students	100
Students attending medical lectures	[1]127
Special students in chemistry and mathematics, and students attending lectures in the Scientific School	38
Resident graduates	3
Total	287
Under-graduates.	
Seniors	65
Juniors	69
Sophomores	76
Freshmen	87
Total	297
Grand total	[2]584

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[1] Now, 1899-1900, 710.

[2] Now, 1899-1900, 4947.

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After detailing the instruction offered to students in the special branches, the following statement is found: "Taking into view the amount of instruction given in this school, the extensive apparatus with which it is furnished, its connection with the numerous cases and operations of one of the best conducted hospitals of the United States, together with the general thorough acquisitions and high respectability of its graduates, it may be doubted whether any seminary in the country offers the means of a more complete professional education than may be obtained in the Medical School of Boston."

The statute regulations relative to medical degrees of the time are very interesting, showing, as they do, how comparatively little in the way of general training was then deemed necessary. The Medical School of that day was essentially a school of medicine in its clinical aspect, and the questions of the great sciences allied to medicine were either not taught because not in existence or were brought under some general heading. The statutes (in part) were as follows: "The Faculty of Medicine consists of the president, and the medical professors and lecturers, one of whom, to be chosen by themselves, shall always be Dean. The Faculty shall hold two examinations annually for the medical degree, at which three members shall be a *quorum* for business." "The following are the conditions on which students are admitted to examinations: 1. Each candidate shall furnish evidence that he is twenty-one years old. 2. He shall have attended two full courses of the lectures in this college. Nevertheless, a similar course in any other college or university approved by the Faculty may take the place of one of these. A third course may be attended without fee. 3. He shall have studied three full years with a regular physician, and be of good moral character. 4. If not graduated in the Arts he shall satisfy the Faculty in respect to his knowledge of the Latin language and experimental philosophy. Certificates of competent persons will be received as satisfactory proof of these facts. Each candidate having complied with these statutes shall be examined

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separately in anatomy, physiology, chemistry, materia medica, midwifery, surgery, and the theory and practice of medicine, and upon his dissertation." (Seven examinations as compared with twenty-eight or nine to-day.) "The decision in regard to each shall be made and declared to him at the close of his examination, by the votes of the major part of the members of the Faculty present, and, if favorable, shall be recorded by the Dean, and by him certified to the President to be laid before the *Senatus Academicus*." It will thus appear that two members of the Faculty might have had the opportunity of conferring the degree of M.D. at that time. The severity of the examinations of to-day as compared with those of fifty years ago needs no comment. A further announcement is made that, "the lectures for medical students, on the various branches mentioned in the statutes, are delivered at the Massachusetts Medical College in Boston. They commence annually on the first Wednesday in November, and continue four months." (!)

This is practically the entire announcement of the Harvard Medical School for the year 1849–50. The school was in the building on North Grove street, then recently completed, and in not a great many years after was suffering from the same overcrowding, and agitating the same sort of ambitious plans for the future as is the case to-day.

In the early seventies the Faculty of the school took the radical step of grading the course of study and requiring students to pass from one subject to another in logical sequence and after examination ; a step that was taken with many forebodings and that resulted in a tremendous pecuniary loss to the school (by cutting off the number of students), but that was so necessary that the struggle to carry it through cannot be realized to-day. In the early eighties the school moved into its present building, and it was then thought that many years would pass before its needs could even occupy the space it then had. On the contrary, even with the help of the Sears addition, the most effective work for the students has been hampered for some time past, and some of the departments are and have been crowded to the extent of often being obliged to refuse special students. Four years ago the Faculty decided to raise the standard of admission to the school by the requirement of a degree from a recognized college in Arts, Letters, Philosophy, or Science, with some special exceptions, and this regulation will go into effect in 1901. It has been looked forward to with much trepidation by many of the teaching force, and with lively fears that the school will lose so many scholars that it will be pecuniarily crippled. It cannot be doubted, however, that if such an unfortunate result should temporarily occur, the friends of the school will support it through any such trying period as generously as has always been the case. That this is practically certain, is shown by the encouragement to the efforts making to bring about the greatest advance that the school has ever thought of — a scheme for securing its future for generations to come, together with the establishment of what will be, if it can be carried through, the most perfect University of Medical Science that the world has yet seen. A place where students of medicine in all its branches may come, to find an equipment perfectly adapted to its uses, and teachers prepared to foster and encourage research in all its directions for the demonstration of new truths, as well as to give instruction in all branches of present medical knowledge.

With this brief review of some of the changes that have occurred in what is concerned with medical teaching, let us turn now to what must be a still more brief review of some of the great changes that new facilities have made in medical knowledge. The changes have been many and of vast importance, and it would seem — if our just hopes are gratified — that more important changes are still to come.

Necessarily, since the discovery of ether, no event has so profoundly influenced medical practice and teaching as the realization by the medical profession of the tremendous importance of the theory of bacterial infection. Ether itself would not have proved the blessing it has if the knowledge of surgical fever, of septicemia, pyemia, and similar processes had not been made as clear as has been the case. Of course the knowledge of bacterial infection does not in any sense cover the whole field of medical advance, but it is of itself the great step of the century, and our exact knowledge of etiology is practically dependent upon it. It is to this part of medical advance that I shall devote the remainder of this paper.

As I have just said, it is the general knowledge of etiology and public hygiene that has most benefited by the increase in our knowledge of the bacteria, and this increase in knowledge has been dependent upon the destruction of the old theory of spontaneous generation. Until this could be definitely done away with it was not possible to secure general support for the assertions regarding the specific nature of the bacteria. When it was possible for one of the acutest students of the day (Nägeli) to affirm that he had seen such varying processes as the fermentation of milk and wine, the souring of butter, anthrax, septicemia, and so on, all produced by the same micro-organism, which also changed its form as well as its results, — and that, easily, — very little belief could be secured for the theory that each of these processes was due to one form of living organism, and one only, and that that retained its shape and general characteristics, or at least returned to a definite group of characters when placed under proper conditions. It was the recognition of the existence of spores in certain of the bacteria and of their extreme resistance to destructive agencies that finally did away with the theory of spontaneous generation and enabled the modern ideas of infectious processes to gain form and strength.

Through this theory of the action of the bacteria in the production of disease we have gained a practical working knowledge that is of incalculable value in the management of these processes, even though our hopes of securing a specific means of treatment have not yet reached their full fruition. What better illustration of this can be given than the absolute disappearance of hospital gangrene or of puerperal fever from the hospitals in which these diseases used to be a curse to the attendants, and a frightful menace to the patients? Neither of them were the object of *specific* treatment in the sense in which we understand the word now — in neither of them has any "antitoxine" been worked out; in fact, as to puerperal fever, it is well known that more than one bacterium may take part in its production. But in both, the gospel of cleanliness according to bacteriological methods has done its work thoroughly, and these diseases have disappeared as a menace to sufferers liable to their attacks because of our knowledge of the bacteria and their methods of action, and for no other reason. Cleanliness, as it was formerly understood, was thoroughly applied, but it was ineffective as compared with the results of to-day, because there was then no conception of what to guard against. It is ridiculous to claim, as a well-known English surgeon has done, that his very excellent results in abdominal surgery were due to common sense and cleanliness, and not to the knowledge of the bacteria, based upon all the experimentation of recent years. This is the very greatest result of this work, — the simplest deduction of all, — that properly applied cleanliness — meaning the exclusion of pathogenic bacteria from wounds — makes it possible for any surgical procedure to be carried out, with absolute certainty that no unfortunate results will follow, so far as surgical fevers are concerned. And what a field has been opened to the surgeon by this fact! Operative interference of all sorts is justifiable now, and is daily carried out, as was never the case before, — and operations are now performed frequently that were hardly dreamed of not many years ago, or if performed, were carried out as a desperate and last resort for the sake of the life of the patient. All this is due, not to the knowledge that cleanliness is important, but to the knowledge of what cleanliness means, and how it is best secured. So brilliant are the results in surgery, and with such comparative ease have they been obtained, that the more complex problems still to be solved in the domain of clinical medicine have been somewhat neglected because the results seen in them have not been as brilliant. If this be so, it is because the conditions surrounding the solution of these problems are infinitely more numerous and confusing. On the one hand is a general fact that the tendency of all healthy tissue is to heal — and that it will heal, if the injury to the vital parts be not too profound, and if bacterial activity be excluded; — the rest is largely a matter of mechanical skill. On the other, is a problem in which are included as most important factors racial and individual peculiarities, with all of their infinite modifications, with changes from the normal induced by bacterial activity already under way. The two problems are hardly to be compared more closely than a simple formula in arithmetic, and a most abstruse astronomical calculation; — both are concerned with the vital functions, but one depends upon allowing those vital functions to act without disturbance, the other requires that these vital functions shall be encouraged to act, while already subjected to adverse influences, in such a way that they may finally return to the normal balance, and while this is taking place that they may resist the further encroachment of the attacking force. It is little to be wondered at that the results in the management of special diseases have thus far been apparently slight, and yet they have really been very great. For although it is true that the only specific of wide applicability in human diseases is the antitoxine of diphtheria, the solving of this problem alone is as great an achievement as one generation can expect.

For the rest, the management of all infectious diseases may be intelligently conducted as never before, and if our knowledge be properly applied the spread of these scourges may be largely arrested, if not prevented entirely. Thus, we know, in typhoid fever, — as we did not know before, — that the infectious material of the disease is contained wholly in the dejecta and the urine; we know, further, that the specific cause of the disease is a non-spore-bearing bacillus, easily destroyed by chemicals, and so we have the problem of how to prevent the spread of this disease from an individual und our care most perfectly solved. What is necessary is the proper management of the dejecta and articles soiled by them, and the danger from that patient is done away with.

Typhoid fever, being produced by a non-spore-bearing bacillus, the infectious material is easy of destruction. The case is otherwise with pulmonary tuberculosis. Here is an instance of the enormous value of the knowledge gained by the study of the bacteria. In the first place, the determination of the fact that this is an infectious disease; in the second, that being an infectious disease, the active principle in its production lies wholly in the expectoration, and that this being properly treated the danger from the individual attacked is reduced to a minimum. But here the laboratory studies of the bacillus of tuberculosis show that the conditions of the problem are different from typhoid fever, — in that the bacillus resists destructive agencies strongly, although not known to be a spore-producer, — so that different and more strenuous methods must be adopted in its management than is the case with the bacillus of typhoid fever. The principle, however, is the same, and, as in these two diseases, so in many others of the infectious processes, the knowledge already given to us teaches us an intelligent method of management that has never before been at our command.

Though briefly stated, these results have not been reached without many failures, mistaken inferences, and stumblings on the path toward the truth. It cannot be doubted that finally we shall reach the goal, toward which they all tend, of securing a means for the arrest of the processes, when once begun; but in the meantime our present knowledge is too valuable not to be applied to its fullest extent, and, as in pulmonary tuberculosis and typhoid fever, so it is our duty in pneumonia, cholera, tetanus, and other diseases in which we know the specific cause and its site, to carefully apply our bacteriological knowledge in their management, as the studies in the laboratory make this knowledge clear. By inference, too, such management is made more easy in the case of the acute exanthemata, in which the specific cause has not yet been clearly demonstrated. For, although we may not know the actual agent in their production, we do know much by circumstantial evidence, which enables us to manage these diseases with much greater safety to our patients and ourselves than was formerly the case. The benefits accruing from our knowledge of bacterial processes are not confined to the management and diagnosis of disease alone. In the latter domain of medicine — that of diagnosis — it is not necessary to more than call to your attention the means for diagnosis dependent upon knowledge of the bacteria, that have been perfected within the last few years. Every one of them is of the utmost value, — either for life-saving or protective purposes. Tuberculosis, diphtheria, typhoid fever, glanders, anthrax, actinomycosis, gonorrhœa, and so on, can not only be discovered with much greater accuracy, but can be treated with much greater intelligence and precision than before. Lest the list given above seem meagre in numbers, other of the diseases less common in this vicinity should be mentioned, for they are as important in themselves as any, and all seem to show the wonderful activity in medical investigation of the last generation, and the marvellous fruits that are the results of that investigation. Tetanus and Rabies, Malignant Edema, Cholera, some few of us know from personal contact with them, — and the same may be said of Bubonic Plague, Malta Fever, and Madura Foot. Leprosy, the scourge of localities infected by it, — Malaria, brought to our special knowledge by the sufferings of many of those returning from the Spanish war, — Influenza, that has apparently become a permanent resident among us, and Pneumonia, always with us, have each and every one become better understood and better amenable to treatment, by reason of the improved knowledge of their causation, methods of diagnosis, or treatment, directly due to the study of the micro-organisms.

So, too, have the studies upon the bacterial flora of the intestines — first begun in this vicinity by the late Dr. John Jeffries in my laboratory — been productive of enormous benefit in the way of feeding, and the beginning of an understanding of the processes of intestinal digestion. The first baby I ever heard of as being fed upon sterilized milk, and, as I believe, the first one ever so treated, was a patient of mine, and the idea of sterilizing that baby's milk came as a direct result of laboratory knowledge. We had then begun to realize that milk formed the very best of natural culture media for bacteria, — and especially for those saprophytic forms that are especially found in indigestion and other infantile diseases, and the procedure was intended to destroy them, and thus prevent adding fuel to the fire already blazing in the digestive tract of *sick* infants. The destruction of these forms, that are easily killed, is all that is accomplished to-day, without so changing the character of the milk as to make it unfit for food. Given a pure milk supply, and proper care of the milk to the time it is consumed, and even this is not necessary.

I should weary you if I should go on to speak further of the application of the knowledge of the bacteria and of fermentative processes to the matters of general hygiene and to commercial purposes. The disposal of sewage by bacterial action in filter beds, the brewing of beer with pure cultures of yeasts, the ripening of butter, and the fermentation of wines by special cultures, are all matters of common occurrence illustrative of what I mean.

A review of the ways in which it has been sought to secure a specific treatment for the infectious diseases, may, however, prove interesting and instructive. The inference to be drawn, is apparently that each process is a problem by itself, and must be worked out for itself by the combined efforts of every one competent to do so.

First, there is vaccination against small-pox. This is really the substituting of a mild type of disease (cow-pox) for a malignant form of a similar but different disease — without reference being had to the actual causative agent in either.

Then came the efforts of Pasteur to secure protection against anthrax, based upon the fact shown in the laboratory, that cultures of the bacillus of this disease could be *attenuated* in virulence upon being subjected to certain abnormal conditions; and that when thus *attenuated* they merely made the animal sick, but did not kill after being inoculated. When the animal had recovered it was found to be in a condition to resist the action of cultures in full virulence. In other words, here was a method of protection against a malignant form of disease by subjecting the patient to an attack of a mild form of *the same disease* (not a different disease, as seen in *vaccination*). This successful production of immunity by an attenuated virus led to many efforts in the same direction — without great success in diseases attacking man, except in rabies. And here the result is somewhat different, for we do not in this case deal with the actual specific cause alone, but with an emulsion of the tissue in which this cause is known to be present.

Then came Tuberculin and Mallëin, both dealing with the intracellular products of growth of the specific causes of the disease, — as seen in the test-tube, — for both Tuberculin and Mallëin are prepared by making glycerin-extracts of the bodies of the bacteria grown in pure culture. Their use is therefore an example of the employment of the chemical products of the bodies of the bacteria, and not the vital activity of the bacteria, as a means for fighting the diseases against which they are directed.

Finally we have the antitoxines of tetanus and diphtheria — the former not so successful clinically, as was hoped, because the disease is so slow in becoming clearly defined that treatment is too long delayed; the latter, the final triumph of the scientific method of laboratory study as applied to the actual treatment of disease. How this triumph has been carried out to its extreme in our own community the statistics of the South Department of the Boston City Hospital will tell more eloquently than any words of mine could possibly do.

So much for the past, — how much this is, I have but feebly pictured to you; — but what of the future? What will the next semi-centennial of this society have to look back upon? Which one of us does not feel sure that we are but upon the threshold of greater advances than those with which we congratulate ourselves now? It requires but little enthusiasm to look for the disappearance of tuberculosis, diphtheria, and the rest, from among us, as completely as has small-pox in the past; and which one of us is not proud to have had some share in obtaining or spreading the knowledge necessary to this great saving of human suffering? Which of us, after a thought of what has been accomplished, is not more ready and eager for the struggle and sacrifices that are to come?

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